THE WEATHER ELEMENTS.

By P. C. DAY, Climatologist and chief of division.

[Dated: Weather Bureau, Washington, D. C., June 2, 1920.]

PRESSURE AND WINDS.

The first few days of the month were marked by rapid and pronounced pressure variations, and storms with steep gradients and of wide extent covered the districts from the Mississippi River eastward. The first storm moved from the southern plains region to the upper Lakes by the morning of the 2d, at which time the sea-level pressure near the center of the storm was below 29 inches, and low pressure prevailed as well over most other districts. The second storm had developed considerable proportions by the morning of the 3d in the far Southwest, and during the 4th and 5th moved to the Atlantic coast districts, attaining wide proportions and causing unusually heavy falls of snow for April over its northern side, particularly from Kansas and Nebraska eastward to the Great Lakes, but without the usual extensively heavy rains to the south and east attending such storms. The pressure was markedly low over the Atlantic coast districts on the 5th; in fact, at many points the readings at some period of the day were the lowest ever observed, and the highest winds of the month prevailed as the storm passed northeastward over New England to the Canadian Maritime Provinces during that and the following day. The latter portion of the first decade was mostly free from decided barometric changes, but during the early part of the second a storm moved eastward over the middle portions of the country, and precipitation was widespread and fairly heavy over the more eastern districts. The latter part of the decade brought stormy conditions due to the passage of a low-pressure area from the far Northwest into the middle Rocky Mountains and plains regions. This storm was attended by unusually heavy snows in the mountains of Colorado and Wyoming and parts of adjoining States as well as over portions of the plains region to the eastward. The snowfall reached unusual depths in the mountains and ranged from 12 to 18 inches on the plains adjoining, greatly delaying traffic and causing much suffering to stock. The eastward progress of this storm was unusually slow, and rainy conditions resulting from general low pressure over the interior districts continued over the central valleys and to the eastward into the early part of the third decade. About the 25th low pressure again set in over the plains region and gradually overspread the Mississippi Valley and eastern districts during the following two or three days, attended by general rains from the Great Plains to the Atlantic, the falls becoming heavy to excessive in portions of the Gulf States, Ohio Valley, and to the northeastward.

The average pressure for the month was below normal in practically all portions of the United States, except locally in North and South Dakota and along the Pacific coast from northern California to Washington. In Canada pressure was likewise below normal from the Great Lakes eastward, but it was generally above in the more western districts. In the eastern districts of both the United States and Canada the monthly pressure was unusually low. In some cases the averages were the lowest ever known in April.

The severe barometric disturbances gave rise to numerous storms over southern districts, frequently of tornadic character and causing the loss of many lives, and much damage to property, full accounts of which will appear in other portions of this REVIEW. The greatest departure from the average pressure was located over the Great Lakes, and St. Lawrence Valley, where the pressure was low during much of the month. As a result the winds from the West Gulf States to the middle Atlantic coast were largely from the South or Southwest, while in the Upper Mississippi Valley and Northern Plains States they were northwest to west.

TEMPERATURE.

The month was marked by persistent cold throughout the greater portion in nearly all districts, and sharp falls in temperature occurred during the early days, particularly following the severe storm of the 4th to 5th, during which time the temperature fell to nearly 30° below zero in the northern mountain districts, and freezing weather was felt southward to the middle portions of the Gulf States, into central Texas, and over large portions of the far Southwest, causing much damage to early fruits and truck. The minimum temperatures observed during this cold wave, particularly on the morning of the 5th, were the lowest of record for April over wide areas between the Rocky Mountains and the Mississippi River, and from the Canadian boundary to the Rio Grande, and Texas coast. The cold wave extended eastward during the following few days, diminishing somewhat in intensity but at the same time giving over most of the country the lowest readings of the month. No severe cold was experienced during the middle and latter portions of the month, but it remained cold in nearly all districts, many stations, particularly in the northern sections, having only an occasional day with temperature above the normal. The week ending April 13 was particularly cold in the Ohio Valley and Great Lakes region, and those of the 20th and 27th in the Mountain and Plateau regions of the West.

The highest temperatures for the month were experienced from the 16th to the 22d over most districts from the Rocky Mountains eastward, and in the far West they were observed near the close. Maximum temperatures above 100° were reported locally from Texas and California, but no previous high records were reached.

The mean temperature for the month was less than normal in all parts of the country, save along the immediate Atlantic and Gulf coasts and at a few points near the coast of California. Over considerable areas in the Rocky Mountain region it was the coldest April, as a whole, in the past 50 years.

PRECIPITATION.

For the month, as a whole, the precipitation, except in a few instances, was far above normal in the States east of the Mississippi and south of the Great Lakes. The amounts were especially large in the middle Gulf States and portions of Florida and the Ohio Valley, where local stations reported total falls ranging frequently from 10 to 15 inches or more. Precipitation was also well above the normal over a wide area from the middle Mississippi Valley westward to California, and generally along the Pacific coast. Along the northern border from Lake Superior to Montana precipitation was less than usually occurs, and similar conditions existed from Texas and Oklahoma westward over New Mexico and Arizona. In portions of western Texas the precipitation was the least ever reported for April.

SNOWFALL.

Some marked variations were presented in the snowfall distribution usually associated with a mid-spring month.

During the Easter season, particularly on Easter Sunday, heavy snow, high winds, and severe cold, usually associated with the Christmas period, prevailed over a wide area from the Middle Rocky Mountains to the Great Lakes. The total snowfall during this period was in many cases the greatest ever known in April, and in some instances the fall was as great as that for the entire preceding winter.

Near the end of the second decade heavy snow fell over the middle Rocky Mountains and the adjacent plains, the depths frequently ranging from 10 to 20 inches over the lower elevations to nearly 100 inches in the high mountains of northern Colorado and southern Wyoming. Several lives were lost, due to the severity of the storms and much loss was sustained by the stock interests, mainly among lambs and calves, but also to older cattle weakened from exposure during the long cold winter and general lack of sufficient feed.

RELATIVE HUMIDITY.

Throughout the country as a whole the relative humidity was higher than normal, although in some sections surprising deficiencies were experienced. This was notably the case in portions of the Ohio Valley and southward over much of the Gulf States, where, despite the heavy and frequent precipitation and the saturated condition of the soil, the relative humidity averaged less than normal, and at some points distinctly so. Over Texas the dry conditions existing during the month were indicated by large deficiencies in the relative humidity, and there were slight deficiencies over the Pacific States and locally along the Atlantic seaboard.

STORMS AND WARNINGS—WEATHER AND CROPS.

STORMS AND WEATHER WARNINGS.

By EDWARD H. BOWIE, Supervising Forecaster.

[Washington, May 21, 1920.]

WASHINGTON FORECAST DISTRICT.

In this forecast district the month was noteworthy by reason of the frequency of alternations of fair and foul weather, low temperatures, and the excess in number and rapid movements of areas of high and low pressure. The month opened with a disturbance of large area and considerable intensity over the central Mississippi Valley, which storm moved rapidly northeastward and on the 3d disappeared in the region of Hudson Bay. It produced general rains east of Mississippi River during the 1st and 2d. On the 1st advisory warnings of strong winds were sent to open ports on Lake Michigan, and on the 2d cold-wave warnings were ordered for the Ohio Valley and the region of the Great Lakes and storm warnings were displayed on the Atlantic coast at and between Cape Hatteras, N. C., and Easport, Me. On the 3d the forecast stated that a storm that was then central over the Texas Panhandle would advance east-northeastward and be attended by general cloudiness and rains over nearly all parts of the Washington forecast district within the next 36 hours with a probability of snow in the upper Lake region. This disturbance moved as forecast and on the 4th, Easter Sunday, rains were general east of the Mississippi River and snow was falling on the Great Lakes. Moreover, on the 3d advisory warnings of snow and strong winds and gales were sent to open ports on Lake Michigan and small-craft warnings were displayed on the Mississippi, Alabama, and northwest Florida coasts. On the 4th northwest storm warnings were displayed on the east Gulf and on the Atlantic coast at and north of Jacksonville, Fla., and cold-wave warnings were distributed over the lower Ohio Valley, Tennessee, and the east Gulf States and over the Carolinas, Virginia, the District of Columbia, and Maryland.

On the morning of the 11th, when a disturbance was central over Kansas, it was forecast that this storm would move east-northeastward and be attended by rains and snows in the region of the Great Lakes and showers and thunderstorms in the Ohio Valley, Tennessee, and the east Gulf States the following night and Monday, the 12th, and by showers Monday, the 12th, in the Atlantic States. This forecast accurately described the conditions that actually occurred. Furthermore, on the 11th advices of gales and snows were sent to open ports on Lake Michigan and the afternoon of the 12th, storm warnings were displayed on the Atlantic coast at and between Jacksonville, Fla., and Eastport, Me.

A disturbance of moderate intensity was central the morning of the 15th over Kansas and its presence made necessary the issue of a forecast of general rains east of the Mississippi River during the succeeding 36 hours. On the morning of the 16th, the center of this distrubance was over Illinois and on the 17th over Virginia. In the meantime a disturbance of marked intensity moved rapidly southeastward from British Columbia, and on the morning of the 17th its center was over Colorado with every indication that it would move eastward and be attended by general rains over the eastern half of the country. The development over southern Canada of an area of high barometric pressure, however, prevented such a movement, and it was not until the 22d that this disturbance finally reached the Atlantic Ocean. It produced general rains, however, over much of the country east of the Rocky Mountains, and on the 20th severe local thunderstorms and tornadoes occurred in the East Gulf States and Georgia. This disturbance was followed by another that made its appearance in the Northwestern States on the 19th. It moved southeastward during the 20th, and the morning of the 21st its center was over northwestern Kansas, whence it moved east-northeastward and reached the Grand Banks on the 25th, attended by general rains over the Northern and Eastern States.

The last important storm of the month had its center on the morning of the 26th over Mississippi, whence it moved northeastward and disappeared north of the St. Lawrence River on the 29th. Storm warnings were displayed in connection with this disturbance on the Atlantic coast at and north of Block Island, R. I., and on Lakes Erie, Ontario, Huron, eastern and central Lake Superior, and extreme northern Lake Michigan.